

Applicati n No.: 10/901,500

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REMARKS**Present Status of the Application**

The drawings are objected to under 37 CFR 1.83(a). The Office Action rejected claims 1-9,12-21. Specifically, the Office Action rejected claims 1-5, 7 and 12-18 under 35 U.S.C. 102(b), as being anticipated by Takahashi et al. (U.S. 4,400,438). The Office Action also rejected claims 1-7, 9, 12-18, and 20-21 under 35 U.S.C. 103(a), as being anticipated by Takahashi in view of Watanabe et al. (U.S. 3,936,575). Applicants have amended the drawing and the specification to overcome the objection and have canceled claim 9,12, and 21 and amended claims 1, 13, and 20 to improve clarity. After entry of the foregoing amendments, claims 1-8,13-20 remain pending in the present application, and reconsideration of those claims is respectfully requested.

Summary of Applicant's Invention

The Applicant's invention is directed to a method of laminating copper foil onto a substrate of a printed circuit board, wherein the substrate has an upper surface and a lower surface. Isolating material is coated onto both surfaces of the substrate to form isolating layers on the substrate. The isolating layers can be formed by roll coating. The thickness of the isolating layers can be controlled in accordance to the requirements of the circuits. Various types of metal foils can be laminated onto the isolating layers, followed by heating and pressurization processes to secure the metal foil onto the substrate.

Discussion of Objections

The OFFICE ACTION objected to the claims under 37 CFR 1.126 because the claims 10-24 are not continuously numbered. Applicants have renumbered claims 10-24 as claims 9-23, respectively. Claim 13 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 12. In response thereto, applicants have canceled claim 12.

Discussion of Office Action Rejections

The Office Action rejected claims 20 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point and distinctly claim the subject matter.

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Applicants have amended the typographic error "the adhesive layers" in claim 20 to --the isolating layers--. Thus, the rejection is overcome.

The Office Action rejected claims 1-5 and 12-18 under 35 U.S.C. 102(b), as being anticipated by Takahashi et al. (U.S. 4,400,438).

Applicants respectfully traverse the rejections for at least the reasons set forth below.

Nevertheless, Applicants have amended claims 1 and 13 to more clearly define the present invention. Claims 1 and 13 as amended read as follows:

1. A method of laminating copper foil onto a substrate of printed circuit board, the steps of the method comprising:
providing a substrate having an upper surface and a lower surface;
coating isolating material onto the upper surface and the lower surface of the substrate by using a rolling process;
performing a curing process to allow the isolating material to form isolating layers with a predetermined thickness on the upper surface and the lower surface of the substrate; and
laminating metal foils onto the isolating layers formed on the surfaces of the isolating layers.

13. A method of laminating copper foil onto a substrate of a printed circuit board, the steps of the method comprising:
providing a substrate having an upper surface and a lower surface;
coating isolating material onto the upper surface and the lower surface of the substrate by using a rolling process;
performing a curing process to allow the isolating material to form isolating layers with a predetermined thickness on the upper surface and the lower surface of the substrate;
laminating metal foils onto the surfaces of the isolating layers; and
performing heating and pressurization processes to secure the metal foils to the surfaces of the isolating layers.

Takahashi et al. at least do not teach or suggest the emphasized features of claims 1 and 13. More specifically, Takahashi et al. do not disclose coating isolating material onto the upper surface and the lower surface of the substrate is performed by a rolling process. Because the rolling process is used to coat the isolating material, the thickness of the isolating layers can be controlled by equipment parameters according to the present invention. Takahashi teaches dipping a base material to impregnate the base material in a varnish containing flame resistant resin, and the impregnated base material is dried to prepare a prepreg having a resin content of 30

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to 55% by weight. Col. 8, lines 53-55. It is clear that Takahashi does not teach coating an isolating material and forming an isolating layer on a substrate, he teaches impregnating a base material such as glass cloth with a varnish by dipping. The base material of Takahashi is not a substrate in the sense, it is not ready for receiving a defined isolating layer, it is a fibrous material subject to impregnation with 30 to 55% of resin. In the present invention, the substrate is ready for receiving a defined isolating layer with predetermined thickness on its surface. Indeed, the prepreg prepared by dipping, impregnating, and drying the base material in Takahashi is served as a substrate. Thus, Takahashi does not teach or suggest forming an isolating layer on the surface of the substrate. In fact, the thickness of the varnish compound can not be controlled easily by using the method of dipping.

For at least the foregoing reasons, Applicant respectfully submits that independent claims 1 and 13 are not anticipated by Takahashi. For at least the same reasons, dependent claims 2-5, 7, and 14-18 are not anticipated by Takahashi either.

The Office Action also rejected claims 1-7, 9, 12-18, and 20-21 under 35 U.S.C. 103(a), as being obvious over Takahashi in view of Watanabe et al. (U.S. 3,936,575).

The Office Action cited Watanabe to render obvious roll coating to impregnate the glass fabric substrate in a copper-clad laminate. However, Watanabe cannot cure the deficiencies of Takahashi as discussed above.

Watanabe discloses impregnating an insulating fibrous base material with a resin composition and drying the impregnated base material to form a prepreg containing a resin content of 20-70(Wt.)*, then bonding the impregnated base material to a metal foil by application of heat and pressure by means of press rolls. Col. 10, lines 12-27. On Col. 10, lines 54-62, Watanabe further teaches that "[A]n insulating fibrous base material in the web form is impregnated in the roll-coating zone with a varnish coating a resin composition and then evaporating the solvent in the drying zone, to form the B-state resin composition. The thus treated base material ... is sent to the press-roll zone where the base material comes into close contact with a metal foil... to form a laminate". Clearly, the varnish is applied to an insulating base material in the web form to impregnate it. The insulating base material in the web form is different from the substrate recited in claims 1 and 13, in the sense, it is not ready for receiving a

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defined isolating layer, it is subject to impregnation with 20 to 70% of resin. Thus, Watanabe does not teach coating an isolating layer on the surface of a substrate by a rolling process either. Further, Watanabe does not teach or suggest forming an isolating layer with a predetermined thickness on the surface of the substrate. In Watanabe et al's invention, the rolling process is used to bond the impregnated base material to a metal foil.

Therefore, the combination of Takahashi and Watanabe still fails to teach all of the features as recited in independent claims 1 and 13.

For at least the foregoing reasons, Applicant respectfully submits that independent claims 1 and 13 patently define over the prior art references, and should be allowed. For at least the same reasons, dependent claims 2-7, 9, 14-18, and 20 patently define over the prior art as well.

In addition, these dependent claims contain features that further distinguish over the cited prior art. For example, claims 2 and 14 recite that the substrate is made of flame-retardant epoxy-glass fabric composite resin (FR-4, FR-5) or bismaleimide-triazine (BT), which is clearly different from the base material of Takahashi and Watanabe. Claims 6 and 20 recite that the thickness of the isolating layer is controlled by equipment parameters regardless of the type of the metal foil the is used. Neither Takahashi nor Watanabe teaches or suggests such features.

The Office Action rejected claims 1-4, 6, 7, 9, 12-16 and 18-20 under 35 U.S.C. 103(a), as being obvious over Watanabe et al. (U.S. 3,936,575) in view of Takahashi (US 4,400,438).

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For similar reasons discussed above, claims 1-4, 6, 7, 9, 13-6, and 18 -20 are patentable over Watanabe in view of Takahashi.

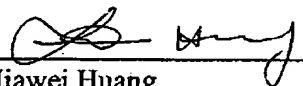
The Office Action rejected claims 8 and 19 under 35 U.S.C. 103(a), as being obvious over Watanabe et al. and/or Takahashi in view of Yates et al. (US 6,270,648).

Yates is cited to show that different treatments are known to produce high profile, low profile or reverse copper fiols. However, Yates cannot cure the deficiencies of Watanabe and Takahashi as discussed above. Thus, claims 1 and 13 as well as their dependent claims 8 and 19 are patentable over Watanabe et al. and/or Takahashi in view of Yates et al.

CONCLUSION

For at least the foregoing reasons, it is believed that the pending claims 1-8, 13-20 are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

Respectfully submitted,
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